

14. (Original) The apparatus of claim 10 wherein said demultiplexer, said switches and said multiplexers are all formed in a planar arrangement on one or more substrates.

15. (Original) The apparatus of claim 14 wherein the demultiplexer and said multiplexers are waveguide grating routers.

16. (Original) The apparatus of claim 14 wherein said switches are Mach-Zehnder interferometers.

17. (Original) The apparatus of claim 16 wherein said switches are activated thermooptically.

18. (Original) The apparatus of claim 10 in which the outputs of said multiplexers are connected to an $N \times N$ waveguide grating router.

REMARKS

Claims 1 – 7, 9 – 11, 13 -18 are pending in the application and all have been rejected under 35 USC 103(a).

Claims 1, 9, and 10 have been amended in this amendment.

35 USC 103(a) Claim Rejections- Mendez in view of Weaver

Claims 1, 2, 7, 9, 10, 11, 13, and 18 have been rejected under 35 USC 103(a) as being unpatentable over Mendez et al “as applied to claim 1 above, and further” in view of Weaver (US Patent 5,524,155).

Applicant assumes that that Examiner did not mean to include the phrase “as applied to claim 1 above, and further” as part of the rejection, which seems to imply that claim 1 was rejected only on the basis of Mendez, while claims 2, 7, 9, 10, 11, 13, and 18 were rejected over the combination of Mendez and Weaver. But rather, it seems that Examiner intended to also reject claim 1 over the combination of Mendez and Weaver.

Applicant’s invention is directed to an improvement of a wavelength routing device or $1 \times K$ wavelength-selective cross connect (WSC) which includes a demultiplexer, binary tree, and K multiplexers. Applicant has recognized that when a set of shutters is interposed in front of the multiplexer inputs and operated in conjunction with the binary tree switch so as to form a dilated router, the resulting router will provide additional crosstalk isolation (page 3, lines 20-22). As discussed in my specification at page 5, lines 8-10, the shutters serve to dilate the router, ensuring that every undesired path through the router encounters at least two closed switches/shutters, improving the crosstalk attenuation. While this blocking of “undesired crosstalk signals” aspect of the present invention was previously recited in independent claims 1, 9, and 10, these claims have been further amended to recite additional details as to how the operation of the shutters are operated in conjunction with the binary tree. Thus, independent claims 1, 9, and 10 have been amended to recite that the shutters are “operated in conjunction with the binary tree so as to dilate said router so that desired paths of coupled individual wavelengths pass through the binary tree to the plurality of K multiplexers while every undesired path of the individual wavelengths through the binary tree encounters both a closed 1×2 switch and shutter so as to block undesired crosstalk signals into said multiplexers” Support for this aspect of the invention is described on page 5, lines 13 – 16, where for the desired λ_1 signal path the shutter 320-1 is open to pass the wavelength λ_1 to port 310-1 and where to block the undesired λ_1 crosstalk paths the shutters 320-5, 320-9, and 320-13 are closed. Since the blocking of “undesired crosstalk signals” was previously recited in independent claims 1, 9, and 10, no new issue has been raised by these amendments to independent claims 1, 9, and 10.

The Examiner states that (1) Mendez discloses every aspect of the claimed invention except for the plurality of shutters and that (2) Weaver discloses a demultiplexer comprising a plurality of shutters. The Examiner then states that it would have been obvious to a person skilled in the art to modify Mendez “to include the plurality of shutters for the purpose of blocking certain input signals as shown in Weaver’s reference.”

For the reasons stated below, applicant disagrees with Examiner that it would have been obvious to a person skilled in the art to combine Mendez and Weaver.

Mendez describes a crossbar switch in Fig. 11 implemented using 1x2 switches. The crossbar switch is used to select a desired input wavelength to be switched to a selected output port. Mendez, however, does not discuss crosstalk or how to block undesired crosstalk paths.

Weaver discloses a demultiplexer 10 comprising a plurality of shutters 14 which are used together with optical filter 13 to select a desired wavelength from a wavelength-multiplexed optical signal. In Weaver, the shutters 14 are used only to select wavelengths over desired paths, there is no mention of crosstalk or how the shutters 14 can be used to block undesired crosstalk paths of that selected wavelength from being coupled to other outputs.

A person skilled in the art (PSIA) looking to select or switch wavelengths would recognize that either the Mendez crossbar switch or the Weaver shutter arrangement might be used to perform the same wavelength select or switch function. Thus, that PSIA would also recognize that if one wanted to select or switch wavelengths he/she could use either the Mendez crossbar switch or the Weaver shutter arrangement, but since they both can essentially do the same function it would be duplicitous and offer no perceived advantage to use a Mendez crossbar switch in combination with the Weaver shutter arrangement.

Since neither Mendez nor Weaver (1) discuss the “undesired signal crosstalk” that may occur in such wavelength switching arrangements, they do not discuss (2) dilated switches and how they reduce “undesired signal crosstalk” or that (3) by combining a crossbar switch with a shutter arrangement one could implement a dilated router which would reduce “undesired signal crosstalk” by blocking undesired crosstalk signal paths. Thus, there is no recognition in either

Mendez or Weaver of the problem of “undesired signal crosstalk” let alone how to block these undesired crosstalk signal paths.

Since neither Mendez nor Weaver recognize the “undesired signal crosstalk” problem, they offer no suggestion why or reasons or motivations for, either explicitly or implicitly, for eliminating the crosstalk problem. Thus neither Mendez nor Weaver suggest or hint that by combining Mendez crossbar switch with the Weaver shutter arrangement one could form a dilated switch to block crosstalk signal paths to reduce the problem of “undesired signal crosstalk.” Hence neither Mendez nor Weaver provide any motivation for providing such a combination, and, consequently, it would not be obvious to a PSIA. This would be particularly so since the PSIA would recognize that since both Mendez and Weaver only teach wavelength switching arrangements, the combination would produce no apparent or suggested advantage, but rather would be duplicative - a disincentive. Hence there is no incentive to the PSIA to combine Mendez and Weaver. Thus clearly, it would not be obvious to a PSIA to combine Mendez and Weaver to form a dilated switch to block crosstalk signal paths as now more clearly recited in my amended claims 1, 9, and 10. Moreover, even if a PSIA were motivated to add Weaver’s shutters to Mendez (although no motivation is provided in Mendez or Weaver) the mere adding of Weaver’s shutters to Mendez would still not still not produce my dilated router unless the shutters were operated in conjunction with the binary tree, in the manner now recited in amended claims 1, 9, and 10, so as to form a dilated router.

It is respectfully submitted that the Examiner has skillfully used impermissible hindsight, using applicant’s independent claims as a guide to allegedly adapt the Weaver shutter elements to Mendez to arrive at applicant’s invention. To properly combine prior art references to show obviousness, there must be some teaching, suggestion or incentive to make the combination. Consequently, it is insufficient that the Mendez and Weaver combination merely disclose the components of applicant’s invention: there must be some teaching, suggestion, or incentive to make the combination made by my claimed invention. Since such motivation is not provided by Mendez nor Weaver, the proffered combination of Mendez in view of Weaver is improper, and for this reasons the rejection under 35 USC 103(a) of amended independent claims 1, 9, and 10 should be withdrawn. Thus, as amended independent claims 1, 9, and 10 should be allowable

Mendez in view of Weaver under 35 USC 103(a), as should dependent claims 2, 7, 11, 13, and 18.

35 USC 103(a) Claim Rejections- Mendez/Weaver in view of Okawa

Claims 4 and 15 have been rejected under 35 USC 103(a) as being unpatentable over Mendez as applied to claim 1 above, and further in view of Okawa (US Patent 6,069,990).

Again, applicant believes that Examiner rejection meant to say “Mendez in view of Weaver as applied to claim 1 above, and further in view of Okawa.”

Okawa discloses WGR multiplexer and WGR demultiplexer. However, Okawa does not suggest what is lacking in the Mendez and Weaver combination, i.e., how to solve the problem of “undesired signal crosstalk” or how to use dilated switches/shutter combination to overcome the problem. Consequently, combining Okawa together with Mendez in view of Weaver would still not anticipate, suggest, or make obvious amended independent claims 1 and 10 under 35 USC 103(a). Thus, dependent claims 4 and 15 should now be allowable under 35 USC 103(a) over Mendez in view Weaver and further in view of Okawa for the same reasons as amended independent claims 1 and 10, respectively.

35 USC 103(a) Claim Rejections- Mendez/Weaver in view of Ueda

Claims 5-6 and 16-17 have been rejected under 35 USC 103(a) as being unpatentable over Mendez as applied to claim 1 above, and further in view of Ueda (US Patent 6,163,663).

Again, applicant believes that Examiner rejection meant to say “Mendez in view of Weaver as applied to claim 1 above, and further in view of Ueda.”

Ueda discloses Mach-Zender interferometer circuits, which are, activated thermooptically. However, Ueda does not suggest what is lacking in the Mendez and Weaver combination, i.e., how to solve the problem of “undesired signal crosstalk” or how to use dilated switches/shutter combination to overcome the problem. Consequently, combining Ueda together

with Mendez in view of Weaver would still not anticipate, suggest, or make obvious amended independent claims 1 and 10 under 35 USC 103(a). Thus, dependent claims 5-6 and 16-17 should now be allowable under 35 USC 103(a) over Mendez in view Weaver and further in view of Ueda for the same reasons as amended independent claims 1 and 10, respectively.

Summary

In summary, all pending claims 1 – 7, 10, 11, 13 - 18 should now all be allowable over the art of record under 35 USC 103(a) and the same is respectfully requested.

Since this application is on Final, applicant's attorney would particularly welcome a call from the Examiner to discuss any questions or unresolved issues regarding this response.

Respectfully,

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